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Discussion

Dr Gordon A Cohen *(Seattle, Wash).* Dr Ungerleider, I would like to congratulate you and your coauthors for this excellent work and I want to thank you, actually, for doing it because I think it is a meaningful study in that nothing has been published with contemporary results on repair of aortic coarctation in quite awhile, and so I really think that this adds to the literature.

I have a series of questions. I will break them into 4 general themes and I will address all 4 themes now, but if you need me to repeat any of them just let me know.

First, how does this information influence our practice moving forward? Should we make any changes in how we practice and should we make any changes in how we counsel families about the surgical risk?

Second, what is the data quality, what are the limitations of the data, and how are the data limited by combining coarctation and hypoplastic aortic arch into a single group? Does this confuse the message of your study?

Third, we often think of coarctation repair as a straightforward operation with a short hospital stay. These data demonstrated a 25% incidence of complication for coarctation and the hypoplastic aortic arch group, and even higher for the other 2 with an overall 36% incidence of complications. Should we be adjusting our own expectations as well as those of the families for these operations? How could we use this information to reduce complication rates?

And last, I was actually surprised to see the large percentage of patients with these diagnoses who are being operated on outside of the neonatal period. Can you speculate as to why? Interestingly, I went to the database at Seattle Children's since July 2006 and looked up our own experience, because I thought it was different than what we actually do, and in fact found almost identical numbers; so can you speculate as to why that is the case?

Dr Ungerleider. Thank you, Gordon, not only for your questions but for your friendship over the years.

You first question was: How is this going to influence our practice? I do not know whether it will influence our practice or whether it should, but it certainly should help us understand our practice. We have a lot of data now that are collected that can give us information that we can relate to our families or to our colleagues about expectations. It also shows us a little bit about how we want to modify the database in the future to answer questions that we just simply cannot answer here, like recurrence rates or what happens from VSD management strategies, so we have some limitations with what we can say with the STS database the way it is currently constructed.

You asked about data quality—Do we confuse the issue by including hypoplastic aortic arch patients with coarctation patients?—and I hope we did not. We spent a lot of time thinking about this and we just did not know how to separate patients having aortic arch repair from patients having coarctation repair, because when patients have important narrowing of the aortic arch, some people may call that an aortic arch repair and some people a coarctation repair, and until we insert into the STS-CHSD some kind of anatomic or physiologic descriptor that will guide the coding of arch repair versus coarctation repair—and we would recommend that perhaps that be repair that extends proximal to the left common carotid artery—until we have that, we really cannot separate those patients. We would like to analyze them. I can tell you that when we looked at hypoplastic arch repair versus coarctation repair, the incidence of mortality went up by about 1% for each group. That is, 1% mortality increase from coarctation repair to coarctation plus VSD, another 1% increase in mortality for hypoplastic arch repair, and then a 1% increase when VSD repair was added to hypoplastic arch repair, but I cannot comment on the quality of those data because we cannot specify how patients are assigned (by their various surgical groups) to each particular repair type.

You asked about coarctation and whether it is a straightforward operation and the incidence of complications. It can be a straightforward operation. As you see, only about half the patients in the isolated group had complications. It can also be a very complex operation, with a high likelihood of complication, so I think it is important to recognize that. The length of stay for isolated coarctation was about 5 days as a median. It went up to about 11 days if there was a VSD and was about 9 days when coarctation existed with other lesions, so it can be a complex convalescence.

Last, you asked about the incidence of neonates versus other patients. It is interesting that you went back to your database. I always say the memory is a poor database and so we may remember that we are operating on a lot of neonates and infants, and forget that there are other patients that are getting operated on as well. The map is not the territory, meaning that our own individual experiences may not represent the overall totality of experience in the country, and that is a major benefit of the STS database. I think the numbers here are pretty good and I would suggest that what we are seeing is that about half the patients overall being operated on for coarctation are neonates, that this percentage of neonates is higher in the patients with more complex disease, and that the incidence of complications after coarctation repair is higher than we would initially remember. Thank you.

Dr Cohen. Thanks. One other quick comment. Thank you, by the way, for giving me the paper in advance and allowing me to review it, but one thing that was not clear to me from the paper and even from the presentation: I am assuming that you excluded hypoplastic left heart syndrome from group 3. You did say that you included single ventricles. It would be helpful, I think, both in the manuscript and in the discussion to clarify that.

Dr Ungerleider. They were excluded. Hypoplastic left heart syndrome is a separate disease. They get arch repairs, but they usually get something in addition.

Dr Tara Karamlou *(San Francisco, Calif).* Hi, Ross. Great paper. I just had one quick comment and a question.

In terms of looking at complications like recurrent laryngeal nerve injury, I think those things in this database are extremely problematic because we do not really know the denominator. I think we have to look at those data cautiously.

One of the things that struck me as curious was that there was a much increased incidence of nerve injury when you had a concomitant VSD as opposed to other complex lesions. Do you have a reason why you think that is the case or do you think it is just an anomaly of the data?

Dr Ungerleider. Clearly, the incidence of recurrent laryngeal nerve would probably be very different if it were looked for in all patients. All patients would have to receive some form of direct exam, and I think that the STS database information in this study only represents those patients who had aphonia or aspiration or a reason to be coded as recurrent laryngeal nerve injury. We can use these kinds of data to guide our questions for the future, and so if we really want to know more about why there seems to be a higher incidence of recurrent laryngeal nerve injury in certain subgroups of patients, we need to construct the database to help us answer those questions in the future. Thank you all.